

1 storing in a z-range buffer minimum and maximum depth values for the layers in
2 the block, the z-range buffer further storing a bitmask value, each bit in the bitmask
3 value associating a pixel in the block to a layer in the block;
4 comparing a depth value of the polygon with a depth value of a particular layer in
5 the block stored in the z-range buffer; and
6 identifying visible pixels in the block making up the polygon based on the
7 comparison.

1 2. The method of claim 1, wherein the polygon in the display block is a triangle.

1 3. The method of claim 1 further comprising the step of initializing the minimum
2 and maximum depth values of the layers in the block to a depth value corresponding to
3 a background of the block. /

1 4. The method of claim 1, wherein the layers in the block comprise a first layer and
2 a second layer, each pixel in the block being associated with either the first layer or the
3 second layer, the first layer having depth values ranging from a first minimum depth
4 value to a first maximum depth value, and the second layer having depth values
5 ranging from a second minimum depth value to a second maximum depth value.

1 5. The method of claim 4, wherein the step of comparing depth values comprises
2 determining whether the polygon is located closer to a viewpoint than a first layer.

1 6. The method of claim 4, wherein the step of comparing depth values comprises
2 determining whether the polygon is further from the viewpoint than the first layer but
3 closer to the viewpoint than the second layer.

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1 7. The method of claim 4, wherein the step of comparing depth values comprises
2 determining whether the depth value ranges of the polygon intersect with the depth
3 value ranges of the first layer.

1 8. The method of claim 4, wherein the step of comparing depth values comprises
2 determining whether the depth value ranges of the polygon intersect with the depth
3 value ranges of the second layer.

1 9. The method of claim 1 further comprising the step of updating bits of the
2 bitmask value, the bits corresponding to the pixels in the block making up the polygon.

1 10. The method of claim 1 further comprising the step of updating the minimum and
2 maximum depth values of a layer in the block.

1 11. (Amended) A computer graphics display interface for use with a computer
2 system having a display monitor, the interface comprising:
3 a memory including a z-range buffer for storing minimum and maximum depth
4 values of one or more layers of pixels of a display block, the z-range buffer further
5 storing a bitmask value, each bit in the bitmask value associating a pixel in the block to
6 a layer in the block; and

7 a processor unit coupled to the memory for partitioning a screen of the display
8 monitor into a plurality of display blocks having one or more layers of pixels,
9 comparing a depth value of a polygon in a display block with a depth value of a
10 particular layer in the block, and identifying visible pixels in the block making up the
11 polygon based on the comparison.

1 12. (Amended) The system of claim 11, wherein the polygon in the display block is a
2 triangle.

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1 13. The system of claim 11, wherein the layers in the block comprise a first layer and
2 a second layer, each pixel in the block being associated with either the first layer or the
3 second layer, the first layer having depth values ranging from a first minimum depth
4 value to a first maximum depth value, and the second layer having depth values
5 ranging from a second minimum depth value to a second maximum depth value.

1 14. In a graphics display system having a digital circuit topology having a set of
2 primary input gates and a set of primary output gates, a method of detecting hidden
3 surfaces of a polygon in a display block, the polygon having depth values
4 corresponding to a minimum depth value and a maximum depth value, the method
5 comprising:

6 storing in a z-range buffer minimum and maximum depth values for the layers in
7 the block, the z-range buffer further storing a bitmask value, each bit in the bitmask
8 value associating a pixel in the block to a layer in the block;

9 comparing a depth value of the polygon with a depth value of a particular layer in
10 the block stored in the z-range buffer; and

11 identifying visible pixels in the block making up the polygon based on the
12 comparison.

1 15. The method of claim 14, wherein the polygon in the display block is a triangle.

1 16. The method of claim 14, further comprising the step of initializing the minimum
2 and maximum depth values of the layers in the block to a depth value corresponding to
3 a background of the block.

1 17. The method of claim 14, wherein the layers in the block comprise a first layer and
2 a second layer, each pixel in the block being associated with either the first layer or the
3 second layer, the first layer having depth values ranging from a first minimum depth

4 value to a first maximum depth value, and the second layer having depth values
5 ranging from a second minimum depth value to a second maximum depth value.

1 18. The method of claim 17, wherein the step of comparing depth values comprises
2 determining whether the polygon is located closer to a viewpoint than a first layer.

1 19. The method of claim 17, wherein the step of comparing depth values comprises
2 determining whether the polygon is further from the viewpoint than the first layer but
3 closer to the viewpoint than the second layer.

1 20. The method of claim 17, wherein the step of comparing depth values comprises
2 determining whether the depth value ranges of the polygon intersect with the depth
3 value ranges of the first layer.

1 21. The method of claim 17 wherein the step of comparing depth values comprises
2 determining whether the depth value ranges of the polygon intersect with the depth
3 value ranges of the second layer.

1 22. The method of claim 17 further comprising the step of updating bits of the
2 bitmask value, the bits corresponding to the pixels in the block making up the polygon.

1 23. (Amended) The method of claim 17 further comprising the step of updating the
2 minimum and maximum depth values of a layer in the block.

1 24. A computer-readable medium comprising:
2 a program code embodied in the computer readable medium for
3 causing detection of hidden surfaces of a polygon in a display block, the polygon
4 having depth values corresponding to a minimum depth value and a maximum depth

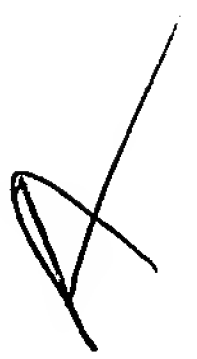
5 value, the computer-readable program segment comprising instructions for performing
6 the steps of:
7 storing in a z-range buffer minimum and maximum depth values for the layers in
8 the block, the z-range buffer further storing a bitmask value, each bit in the bitmask
9 value associating a pixel in the block to a layer in the block;
10 comparing a depth value of the polygon with a depth value of a particular layer in
11 the block stored in the z-range buffer; and
12 identifying visible pixels in the block making up the polygon based on the
13 comparison.

1 25. The computer-readable medium of claim 24, wherein the polygon in the display
2 block is a triangle.

1 26. The computer-readable medium of claim 24, wherein the computer-readable
2 program segment further comprises instructions 35 for initializing the minimum and
3 maximum depth values of the layers in the block to a depth value corresponding to a
4 background of the block.

1 27. The computer-readable medium of claim 24, wherein the layers in the block
2 comprise a first layer and a second layer, each pixel in the block being associated with
3 either the first layer or the second layer, the first layer having depth values 10 ranging
4 from a first minimum depth value to first maximum depth value, and the second layer
5 having depth values ranging from a second minimum depth value to a second
6 maximum depth value.

1 28. The computer-readable medium of claim 27, wherein the step of comparing
2 depth values comprises determining whether the polygon is located closer to a
3 viewpoint than a first layer.



1 29. The computer-readable medium of claim 27, wherein the step of comparing
2 depth values comprises determining whether the polygon is further from the viewpoint
3 than the first layer but closer to the viewpoint than the second layer.

1 30. The computer-readable medium of claim 27, wherein the step of comparing
2 depth values comprises determining whether the depth value ranges of the polygon
3 intersect with the depth value ranges of the first layer.

1 31. The computer-readable medium of claim 27, wherein the step of comparing
2 depth values comprises determining whether the depth value ranges of the polygon
3 intersect with the depth value ranges of the second layer.

1 32. The computer-readable medium of claim 24, wherein the computer-readable
2 program segment further comprises instructions for updating bits of the bitmask value,
3 the bits corresponding to the pixels in the block making up the polygon.

1 33. The computer-readable medium of claim 24, wherein the computer-readable
2 program segment further comprises instructions for updating the minimum and
3 maximum depth values of a layer in the block.

A3 1 34. (New) In a computer graphics display system comprising a display monitor, a
2 method of detecting hidden surfaces of a polygon in a display block, the polygon
3 having depth values corresponding to a minimum depth value and a maximum depth
4 value, the method comprising:
5 partitioning a screen of the display monitor into a plurality of display blocks having
6 one or more layers of pixels;
7 storing in a z-range buffer minimum and maximum depth values for the layers in
8 the block, the z-range buffer further storing a bitmask value, each bit in the bitmask
9 value associating a pixel in the block to a layer in the block;

10 comparing a depth value of the polygon with a depth value of a particular layer in
11 the block stored in the z-range buffer; and
12 identifying visible pixels in the block making up the polygon based on the
13 comparison;
14 the layers in the block comprise a first layer and a second layer, each pixel in the
15 block being associated with either the first layer or the second layer, the first layer
16 having depth values ranging from a first minimum depth value to a first maximum
17 depth value, and the second layer having depth values ranging from a second
18 minimum depth value to a second maximum depth value.

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